

## Water content of leaves of *Acer rubrum* from different habitats and different levels<sup>1</sup>

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The aim of the investigation was to obtain definite figures regarding the relative water content of leaves from trees growing in varying habitats, as well as a comparison of the water content of upper and lower leaves from the same tree.

### METHODS

As three habitats, namely pineland aspen,<sup>2</sup> bog, and dry aspen seemed to furnish the desired extremes for comparison, as well as being characteristic of the region, trees were selected from these habitats, and in addition from a fourth group comprised of trees growing in variable situations. The dry aspen habitat was located on a very dry, sandy ridge, to some extent covered by typical aspen plants, but not a normal aspen association due to the extreme lack of moisture and shade.

*Acer rubrum* trees, used because the species was present in all of the desired situations, were located permanently for all but the variable group, leaves being taken from the same trees at each collection. In as far as possible, selected trees were comparable in height and spread of branches. From these trees leaves were collected in the early afternoon, when the maximum amount of evaporation would be expected.

Collections, made from the upper and lower portions of each tree, consisted of typical, healthy leaves, cut off approximately five millimeters from the point where the petiole joins the blade. After cutting, leaves were put into tightly corked and properly labeled bottles, and immediately upon return from the field were weighed, then oven dried to a constant weight. The expression of water content was based on this dry weight of the leaf.

### DATA

The resulting data clearly indicates that the water content of leaves varies with the habitat, as leaves from trees in the bog had the lowest water content, those from the dry aspen area

<sup>1</sup> Based upon work done under the direction of Dr. Frank C. Gates, during July and August 1935, at the University of Michigan Biological Station.

<sup>2</sup> This association is fully described in: Gates, F. C., Aspen Association in Northern Lower Michigan. Bot. Gaz. 90: 233-259. 1930.

were intermediate, and those from the general aspen area had the highest water content. The averages of percentage water content as obtained from the various collections were as follows: bog situation—112, 126; dry aspen—121, 134; and general aspen—142, 154. In each case the first figure given refers to leaves from the upper portion of the tree, and the second figure to the lower leaves.

The idea that trees in bog situations are as unfavorably located in regard to the availability of water as are trees in a dry situation, is supported by data indicating the much lower water content for the leaves of the bog trees than for those from the dry aspen area, in spite of the fact that transpiration must be much less in the bog situation.

The fact that the trees of the general aspen area should have a higher water content than those of the much drier aspen ridge, shows the correlation between the availability of water and the water content, as the situations are comparable in soil and in plant association, with the amount of water in the soil and the transpiration rate as the only variable factors.

The data also indicate that upper leaves of *Acer rubrum* contain significantly less water than the lower leaves of the same trees. A certain amount of correlation of the amount of water present in the leaf with the general weather conditions is shown by the fact that leaves collected after a prolonged period of hot, dry weather had a water content markedly lower than that of leaves collected only a few days after good rains. The lowest percentage of water found in leaves, 107%, was in the upper leaves of the bog trees on August 8, and the highest, 165%, in the lower leaves of the general aspen habitat on July 3.

#### SUMMARY

An investigation of the water content of upper and lower leaves of *Acer rubrum* from different habitats on northern lower Michigan during the summer of 1935 showed that at the driest time of the day upper leaves normally had less water than lower leaves (126:140) and that leaves of trees in bogs had less water in them than trees on dry ridges, and these in turn less than trees in the general mesophytic aspen association (119:128:148).

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